

$\Sigma(1690)$ Bumps

$$I(J^P) = 1(?^?) \quad \text{Status: } **$$

NODE=B058

OMITTED FROM SUMMARY TABLE

See the note preceding the $\Sigma(1670)$ Listings. Seen in production experiments only, mainly in $\Lambda\pi$.

NODE=B058

 **$\Sigma(1690)$ MASS
(PRODUCTION EXPERIMENTS)**

NODE=B058M

VALUE (MeV)	EVTS	DOCUMENT ID	TECN	CHG	COMMENT	
≈ 1690 OUR ESTIMATE						
1698 \pm 20	70	¹ GODDARD	79	HBC	+	$\pi^+ p$ 10.3 GeV/c
1707 \pm 20	40	² GODDARD	79	HBC	+	$\pi^+ p$ 10.3 GeV/c
1698 \pm 20	15	ADERHOLZ	69	HBC	+	$\pi^+ p$ 8 GeV/c
1682 \pm 2	46	BLUMENFELD	69	HBC	+	$K_L^0 p$
1700 \pm 20		MOTT	69	HBC	+	$K^- p$ 5.5 GeV/c
1694 \pm 24	60	³ PRIMER	68	HBC	+	$K^- p$ 4.6-5 GeV/c
1700 \pm 6		⁴ SIMS	68	HBC	-	$K^- N \rightarrow \Lambda\pi\pi$
1715 \pm 12	30	COLLEY	67	HBC	+	$K^- p$ 6 GeV/c

NODE=B058M
→ UNCHECKED ←

OCCUR=2

 **$\Sigma(1690)$ WIDTH
(PRODUCTION EXPERIMENTS)**

NODE=B058W

VALUE (MeV)	EVTS	DOCUMENT ID	TECN	CHG	COMMENT	
240 \pm 60	70	¹ GODDARD	79	HBC	+	$\pi^+ p$ 10.3 GeV/c
130 $^{+100}_{-60}$	40	² GODDARD	79	HBC	+	$\pi^+ p$ 10.3 GeV/c
142 \pm 40	15	ADERHOLZ	69	HBC	+	$\pi^+ p$ 8 GeV/c
25 \pm 10	46	BLUMENFELD	69	HBC	+	$K_L^0 p$
130 \pm 25		MOTT	69	HBC	+	$K^- p$ 5.5 GeV/c
105 \pm 35	60	³ PRIMER	68	HBC	+	$K^- p$ 4.6-5 GeV/c
62 \pm 14		⁴ SIMS	68	HBC	-	$K^- N \rightarrow \Lambda\pi\pi$
100 \pm 35	30	COLLEY	67	HBC	+	$K^- p$ 6 GeV/c

NODE=B058W

OCCUR=2

 **$\Sigma(1690)$ DECAY MODES
(PRODUCTION EXPERIMENTS)**

NODE=B058215;NODE=B058

Mode	
Γ_1	$N\bar{K}$
Γ_2	$\Lambda\pi$
Γ_3	$\Sigma\pi$
Γ_4	$\Sigma(1385)\pi$
Γ_5	$\Lambda\pi\pi$ (including $\Sigma(1385)\pi$)

DESIG=1

DESIG=2

DESIG=3

DESIG=4

DESIG=5

 **$\Sigma(1690)$ BRANCHING RATIOS
(PRODUCTION EXPERIMENTS)**

NODE=B058220

$\Gamma(N\bar{K})/\Gamma(\Lambda\pi)$				Γ_1/Γ_2		
VALUE	EVTS	DOCUMENT ID	TECN	CHG	COMMENT	
small		GODDARD	79	HBC	+	$\pi^+ p$ 10.2 GeV/c
<0.2		MOTT	69	HBC	+	$K^- p$ 5.5 GeV/c
0.4 \pm 0.25	18	COLLEY	67	HBC	+	6/30 events

NODE=B058R1
NODE=B058R1

$\Gamma(\Sigma\pi)/\Gamma(\Lambda\pi)$				Γ_3/Γ_2		
VALUE	CL%	DOCUMENT ID	TECN	CHG	COMMENT	
small		GODDARD	79	HBC	+	$\pi^+ p$ 10.2 GeV/c
<0.4	90	MOTT	69	HBC	+	$K^- p$ 5.5 GeV/c
0.3 \pm 0.3		COLLEY	67	HBC	+	4/30 events

NODE=B058R2
NODE=B058R2

$\Gamma(\Sigma(1385)\pi)/\Gamma(\Lambda\pi)$				Γ_4/Γ_2		
VALUE		DOCUMENT ID	TECN	CHG	COMMENT	
<0.5		MOTT	69	HBC	+	$K^- p$ 5.5 GeV/c

NODE=B058R3
NODE=B058R3

$\Gamma(\Lambda\pi\pi(\text{including } \Sigma(1385)\pi))/\Gamma(\Lambda\pi)$ Γ_5/Γ_2

VALUE	DOCUMENT ID	TECN	CHG	COMMENT
2.0±0.6	BLUMENFELD 69	HBC	+	31/15 events
0.5±0.25	COLLEY 67	HBC	+	15/30 events

NODE=B058R4
 NODE=B058R4

 $\Gamma(\Sigma(1385)\pi)/\Gamma(\Lambda\pi\pi(\text{including } \Sigma(1385)\pi))$ Γ_4/Γ_5

VALUE	DOCUMENT ID	TECN	CHG	COMMENT
large	SIMS 68	HBC	-	$K^- N \rightarrow \Lambda\pi\pi$
small	COLLEY 67	HBC	+	$K^- p$ 6 GeV/c

NODE=B058R5
 NODE=B058R5

$\Sigma(1690)$ FOOTNOTES (PRODUCTION EXPERIMENTS)

NODE=B058

- ¹ From $\pi^+ p \rightarrow (\Lambda\pi^+)K^+$. $J > 1/2$ is not required by the data.
- ² From $\pi^+ p \rightarrow (\Lambda\pi^+)(K\pi)^+$. $J > 1/2$ is indicated, but large background precludes a definite conclusion.
- ³ See the $\Sigma(1670)$ Listings. AGUILAR-BENITEZ 70B with three times the data of PRIMER 68 find no evidence for the $\Sigma(1690)$.
- ⁴ This analysis, which is difficult and requires several assumptions and shows no unambiguous $\Sigma(1690)$ signal, suggests $J^P = 5/2^+$. Such a state would lead all previously known Y^* trajectories.

NODE=B058;LINKAGE=C

NODE=B058;LINKAGE=D

NODE=B058;LINKAGE=A

NODE=B058;LINKAGE=B

$\Sigma(1690)$ REFERENCES (PRODUCTION EXPERIMENTS)

NODE=B058

GODDARD 79	PR D19 1350	M.C. Goddard <i>et al.</i>	(TNT0, BNL) IJ
AGUILAR-... 70B	PRL 25 58	M. Aguilar-Benitez <i>et al.</i>	(BNL, SYRA)
ADERHOLZ 69	NP B11 259	M. Aderholz <i>et al.</i>	(AACH3, BERL, CERN+) I
BLUMENFELD 69	PL 29B 58	B.J. Blumenfeld, G.R. Kalbfleisch	(BNL) I
MOTT 69	PR 177 1966	J. Mott <i>et al.</i>	(NWES, ANL) I
Also	PRL 18 266	M. Derrick <i>et al.</i>	(ANL, NWES) I
PRIMER 68	PRL 20 610	M. Primer <i>et al.</i>	(SYRA, BNL) I
SIMS 68	PRL 21 1413	W.H. Sims <i>et al.</i>	(FSU, TUFTS, BRAN) I
COLLEY 67	PL 24B 489	D.C. Colley	(BIRM, GLAS, LOIC, MUNI, OXF+) I

REFID=32203

REFID=20692

REFID=20687

REFID=32096

REFID=20079

REFID=32197

REFID=32179

REFID=32137

REFID=32196